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Dynamics of renormalization group in the lower half-plane of the coupling constants of the fermionic hierarchical model

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Abstract

© 2015, Allerton Press, Inc. We consider four-component fermionic (Grassmann-valued) field on the hierarchical lattice. The Gaussian part of the Hamiltonian in the model is invariant under the block-spin renormalization group transformation with given degree of normalization factor (renormalization group parameter). The non-Gaussian part of the Hamiltonian is given by the sum of the selfinteraction forms of the 2-nd and 4-th order. The action of the renormalization group transformation in this model is reduced to the rational map in the plane of coupling constants. We investigate the global dynamics of this map in the case when the coupling constant of the 4-th order form is less than zero (lower half-plane) and the renormalization group parameter belongs to the interval [1, 3/2).

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Keywords

fermionic hierarchical model, fixed point, renormalization group